Chapter 15. Collaborating Through Usability in Health and Medical Contexts

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Abstract. New technological developments have resulted in patients performing an ever-increasing range of health-related activities. In these situations, the usability of the associated product is central to non-healthcare professionals performing different processes effectively. As a result, understanding the audience's expectations becomes key to both the usability of the product and the safety of the user. This chapter presents an approach for collaborating with patients to identify their usability expectations based on core cognitive factors that affect the use of items. By focusing on certain cognitive concepts, individuals can identify a patient's usability expectations for factors of access, comprehension, and acceptability. They can then use these findings to develop products the related audience more readily understand and can more easily use. These ideas and this approach, however, is not tied to medical situations. Rather, individuals can employ them to foster effective collaborations for identifying the usability expectations for different groups, situations, and settings.

The nature of many medical processes means collaboration is often central to healthcare (Morley & Cashell, 2017).[1] Hospital visits, for example, usually involve different individuals—from check-in personnel to nurses to physicians—collaborating to collect a patient's health information. In other cases, such collaborations are more direct as when nurses, anesthesiologist, and surgeons interact during an operation. Because such collaborations generally occur in dedicated healthcare settings, individuals often view these dynamics as involving healthcare professionals and happening in specific medical contexts. As a result, patients are often overlooked as central collaborators when developing medical products, procedures, or documentation. Changing healthcare practices, however, mean patients need to become core collaborators when developing healthcare activities or designing medical products—including documentation.

The last decade has seen rapid growth in technologies dedicated to personal health and wellness (Fortune Business Insights, 2020; Phaneuf, 2020). These products range from wearable health monitors to informational websites to DIY videos on healthcare processes. These situations, however, focus on non-medical

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professionals performing wellness activities outside of formal healthcare contexts (Heath, 2016; Resnick, 2019). In such cases, usability becomes central to effective health and wellness, for failure to use a technology effectively or perform a process correctly could result in flawed care and/or injury (Clark & Israelski, 2012; Zhang et al., 2003).

Creating usable healthcare products for such situations involves understanding who is using these products as well as where, when, and how such usage occurs (Melonçon, 2016, 2017; St.Amant, 2020). Addressing this situation requires patients to collaborate in the development of

- New medical technologies to be used by patients and/or their families
- Emerging healthcare practices to be performed by non-healthcare professionals
- Informational/instructional materials associated with such technologies and practices

The challenge becomes fostering such collaborations in a way that makes patients central to these processes. The solution involves user experience (UX) approaches that focus on patients as central collaborators in such activities.

This entry offers a theory-based approach to engaging in such collaborative interactions when examining UX dynamics in medical contexts. Specifically, the entry presents an approach for collaborating with patients to develop usable healthcare *materials*, or the health-related products patients use and the related documentation they rely on when using such products. Known as localized patient experience design (L-PXC), the process involves working with patients to identify:

- Where they engage in healthcare activities
- What factors they associate with usability during such processes
- Which psychological factors guide patient usability expectations in these contexts

Identifying such factors, can help UX professionals create materials (i.e., healthcare product s and associated documentation) that more effectively address user expectations for contexts of care (Melonçon, 2017; St.Amant, 2017a).

Cognition and Conceptualization

Products reflect the assumptions and expectations of their creators (Pacey, 1996; St.Amant, 2017a; Sun, 2012). This is because humans use mental models to guide how they conceptualize ideas and understand processes. For example, when most of us are told to “create a user guide,” we hear the words “user guide,” and our minds access a mental model of what this item is (Eyal, 2014; Lindstrom, 2010). This mental model is an “ideal” representing what we think our final product should be. We then try to create something that resembles that ideal—continually comparing our in-progress work to this ideal in order to replicate that mental model. This approach often guides how we produce everything from a wearable devices and apps to the documentation that accompanies these items.

When individuals use materials (i.e., products or associated documentation), they engage in a similar cognitive process. If told to perform an activity, such as "call your office from your mobile phone," individuals access a mental mode of what that process involves (Eyal, 2014; Lindstrom, 2010). This model includes what individuals need to do and what they need to use to perform the related task. Individuals then replicate the process that appears in this mental model and assume doing so will yield expected results.

The mental models that guide actions and influence usability are not innate. Humans learn them through repeated exposure over time. The more I encounter a "user guide" with certain features, the more I form a mental model noting something should have those features for me to recognize it as a user guide (Aitchison, 1994; Rosch, 1978). If I encounter different user guides, I will note the features common across them, and these common features form my idealized concept of "user guide." I then access this idealized version, called a *prototype*, when thinking about this item (Aitchison, 1994; Rosch, 1978). Over time, I become so accustomed to a user manual resembling a related prototype that I no longer consider what features a user manual should have; rather, I rely on the related mental model to reflexively direct my expectations and actions (Ratey, 2002).

The same situation applies to how I conceptualize the process for using an item. My experiences have taught me how I and others perform a process, and these experiences form a metal model for thinking about such activities. The resulting model includes:

- What I think objects used in that process should look like and do
- Who (if anyone) assists with these activities
- How to identify such person (e.g., by a uniform)
- Which actions I (or others) need to perform in order to achieve a particular objective

These mental models for activities are *scripts* consisting of the prototypes of items and persons I associate with the related process so I can identify and use them (for items) or interact with them (for individuals) during the activity. Such scripts also include mental models for how I expect actions to be done when I or others perform a task (Tomkins, 1978, 1987). Again, the more I perform or observe a process over time, the more the related script becomes embedded in my subconscious until I can perform an activity reflexively. Unfortunately, a lack of interaction and collaboration with others can result in mental models causing usability issues.

Problems with Products and Processes

Problems arise when the mental models of the product or document creators do not match those of the intended users of those products or content (Aitchison, 1994; St.Amant 2017b). I, for example, might think of checking blood pressure as something done at my physician's office where a nurse uses an analog sphygmomanometer and a stethoscope. You, however, might conceptualize this process as something you do yourself using an automatic blood pressure cuff while seated in your office at work. Both processes involve a common objective, but the different mental models that guide such activities will affect how we communicate about the related task.

Consider if I created blood pressure monitoring instructions for you. My instructions might include actions such as "Allow the nurse to apply the blood pressure cuff and position the stethoscope." Such content reflects my mental model, which identifies these actions as essential to this process. You, however, might read these instructors and become confused, for the process I describe is not the one you use when checking your blood pressure. As a result, you might guess at certain activities, perform processes ineffectively, or decide not to use my instructions at all.

This situation involves three usability-related problems based on my assumptions of:

1. Objects unfamiliar to you (e.g., analog sphygmomanometer) that you cannot identify or use.
2. Individuals who will perform the process (e.g., a trained nurse vs. an untrained patient).
3. Setting where the process occurs (e.g., physician's vs. personal office) and what activities can be done there.

In this example, the cognitive model I associate with a particular healthcare processes reflects my own experiences (St.Amant, 2017b). Yet this model could vary from yours due to our different experiences associated with that same activity. The resulting differences could affect how successfully you can use my instructions to perform the related healthcare process. Without awareness of such issues, this problem can occur every time the mental model of a product developer or content creator diverges from that of the intended user. Such situations can create health disparities that affect the equity of care whenever the experiences of different groups and communities are not considered or included when developing health-related products or content for those groups or communities (Braveman, 2014). Such problems can be particularly acute for marginalized groups that have been historically excluded from various healthcare processes and the development of related products or documentation (Baah et al., 2019; Sevelius et al., 2020).

Addressing such situations involves an inclusion-based approach focused on identifying the mental models an audience employs to perform processes and use items. Collaboration, in turn, becomes central to avoiding such issues. The more product developers and content creators collaborate with members of the intended audience during the design and drafting process, the better they can identify and address the mental models audiences associate with usable products and usable content. This requires product developers and content creators to realize they cannot assume how an audience will use an item. Rather, they need to interact with and collaborate with their audience (i.e., users) to understand the mental models influencing usability expectation. Such approaches mean viewing users as central collaborators in the overall design and creation processes. In healthcare situations, such collaborations require the involving patients—the intended users of products and content—throughout development processes to create effective products and documentation. Product developers, content creators, and UX professionals alike therefore need to view patients as central participants, or *patient collaborators*, who play an active role in design and development activities throughout the content creation/product development process.

Expanding Understanding of Users

In healthcare contexts, a central usability problem involves how product developers and content creators conceptualize their users. When these developers and creators access the mental models that guide their activities, they often do so with a particular end user in mind—an idealized version of who the users are. These developers and creators then focus on producing texts, images, and products for that audience (Lindstrom, 2010; St.Amant, 2017b). These assumptions, however, often reflect the developer's or the creator's experiences and associated assumptions of who the end user is.

This approach might have worked when access to health-related products and content remained relatively restricted to formal healthcare venues where they were primarily used by trained healthcare professionals. Today, this situation has changed as a range of heal and wellness technologies now exist for use by individuals with no healthcare background (Heath, 2016; Resnick, 2019). Such factors radically shift:

- What users know about health and medical processes
- What users are able to do and can use when performing a process
- Where users will engage in a task

Addressing such factors is central to creating health-related products or content audiences can use.

The changing nature of healthcare further contributes to this situation. The length of hospital stays in the U.S. continues to decrease as does the time U.S. patients spend interacting with healthcare providers (Bryant, 2017; Frakt, 2016; Linzer et al., 2015;). As such, individuals are becoming increasingly responsible for performing their own healthcare activities or doing so for family members, friends, or neighbors (Gittel, 2009; Gouge, 2016; Woods, 2019). The rise of electronic health records and artificial intelligence in healthcare further complicates this situation by increasingly requiring individuals to enter health and medical data into different systems via various interfaces (Das, 2019; Dunn, 2017; Heath, 2016;). Finally, the market for products like wearable healthcare technologies continues to grow as does the number of wellness technologies targeted at non-healthcare professionals (Dunn, 2017; Fortune Business Insights, 2020; Phaneuf, 2020).

These situations mean product developers and content creators cannot assume who the audience for healthcare information or technologies will be (Melonçon, 2016, 2017). Nor can they assume who to collaborate with when creating healthcare products or medical content. Rather, the collaborators for this emerging context need to be the patients who will use such materials. The challenge becomes determining how to collaborate with patients to tap their expectations for activities in a context of care—or the locations where healthcare processes occur. Such collaborations require strategies that help product developers, content creators, and UX professionals interact with patients to identify associated usability expectations for such contexts of care. Additionally, these collaborations must make patients central participants in the research, development, and design of healthcare products and related documentation/content (e.g., visuals and texts).

Locations, Experiences, and Expectations

Location often influences usability expectations (St.Amant, 2017b, 2018). Humans learn to perform processes in a particular setting, and these experiences shape mental models for using products and contend (St.Amant, 2018). If you have only tested your blood sugar levels in a formal healthcare setting like a hospital, your mental model for this process reflects these experiences. If, however, most of your experiences involve testing your blood sugar levels yourself while at home, then you have a different mental model for what this process entails.

In both cases, the healthcare objective is the same, yet the approach for achieving it differs per what usability entails based on the individual's experiences (Duhigg, 2012; Lindstrom, 2010). In the hospital setting, the perspective of patients is often that of passive participant. Materials designed for them might therefore reflect what patients should allow to be done *to them* and *for them*. The individuals who perform the process, the phlebotomist who draws blood and the lab technician who analyzes it, are the actual users of products and content associated with this process. These individuals have a certain knowledge of the topic, training in the process, and expectations of tools used during an activity.

Conversely, patients who monitor their own blood sugar assume the role of one who performs the process and use associated materials (i.e., products and documentation). The materials these individuals use would thus differ from those created for trained healthcare workers based on the background, training, and tools available to the patient. These factors mean each group (i.e., trained healthcare provider and untrained patient) might have different mental models for a process, and such differences often reflect the location where each process occurs.

In both cases, usability in a location focuses on:

- Who in a location performs an activity.
- What those individuals use in that location to perform the activity.

Product developers and content creator need to address both contextual factors to meet the usability expectations of the intended audience (St.Amant, 2017a). The dynamics of such contexts of care, however, can vary depending on what is available in a setting (St.Amant, 2017a). The challenge becomes identifying the contexts of care individuals associate with using medical products and healthcare documents. The more patients perform healthcare activities, use medical technologies, or review wellness-related content themselves, the greater the prospective variations across contexts of care.

Addressing this situation requires product developers, content creators, and UX professionals to identify the "who" and "what" aspects for a context of care. Collaborations with the patients who will actually use products or documentation in these contexts thus becomes essential to achieving this objective. Fostering such collaborations requires the realization that not all parties have common context of care experiences. Rather, product developers, content creators, and UX professionals need to invite members of the intended audience to participate in the development of the healthcare products and content they will use. Maximizing interactions with and input from the related audience is central to these activities, and localized patient experience design (L-PXD) can facilitate such processes.

Complexities of Contexts of Care

Context of care expectations reflect more than location. They bring with them assumptions of who performs a process, what they use, and what such processes entail (Tompkins, 1978, 1987). Earlier examinations of these ideas focused on localization (i.e., creating items for the setting where they are used) and examined usability expectations in different international healthcare situations (St.Amant, 2017a, 2017b). The shift to patient-centered care mirrors this need to understand the local contexts where individuals use health-related products and content. As such, a localization-focused approach seems well suited for collaborating with patient groups on healthcare-focused product development and content creation.

This approach to understanding how local contexts affect patient expectations is localized patient experience design (L-PXD). It is based upon of Lisa Melonçon's (2016, 2017) patient experience design (PXD) methodology that was later adapted by St.Amant (2017a) to address cross-cultural contexts via international patient experience design (I-PXD). I-PXD applies usability concepts to local healthcare contexts in order to localize (i.e., adapt) content for international settings. L-PXD applies the I-PXD approach to any location—international, domestic, regional, or local—to identify user expectations for contexts of care. In so doing, L-PXD makes patients central development and design collaborators by focusing on three factors:

1. *Access:* How patients access healthcare products and content in the context where a healthcare activity occurs.
2. *Comprehension:* How well individuals can use healthcare products and content in a context of care based on their understanding of
    - Biomedical processes and practices associated with a healthcare process.
    - Uses of tools, technologies, and documentation related to such processes.
3. *Acceptability:* How readily individuals accept product and content as credible and will use such products and content in a context of care (see St.Amant, 2017a).

This focus helps product developers, content creators, and UX researchers collaborate with patients to identify their expectations for different contexts of care (St. Amant, 2017a, 2017b).

Access

Access is central to usability, for how patients access materials in a setting affects their usability and design expectations. L-PXD (St.Amant, 2017a) examines access in terms of:

- *Mode of Access*: The mode individuals associate with accessing healthcare products and content in a setting establishes design expectations for using items (e.g., printed books lying flat or videos organized into easy-to-stop/rewind clips). Different modes also require certain environmental factors to use items in a location (e.g., ample light for reading printed texts or internet access for viewing online videos).
- *Time of Access:* When individuals access materials can affect the activities they can undertake (and how they can perform them) in a location. Performing healthcare processes in an empty, quiet location allows individuals to focus on a task. Doing so when that space is filled with other people can affect one's ability to focus on that activity.
- *Materials and Access:* The materials available in a location—be they tools, technologies, or documentation—affect what activities individuals can perform there. If the items associated with a caregiving process are not present in a location, alternative products, processes, or content needs to be developed to achieve the related healthcare objective in that setting.
- *Mechanisms for Access:* During a healthcare process, individuals might need to obtain information or tools from or share details with individuals

outside of the context of care. Such factors could include requiring information or sharing details about what occurred or accessing tools for performing follow-up processes. If and how individuals access such external factors affects what they can do in a context of care. Identifying how individuals access outside information and products or share information with others is crucial to such understanding healthcare activities.

These factors can affect how individuals perform processes in a context of care. Collaborations with patients can help identify such factors in order to develop products and content that meet related expectations for healthcare processes.

Comprehension

Access to materials does not ensure their use; individuals also need to *comprehend* content, designs, and products in order to:

- Recognize what items are
- Understand the information provided or the uses of the product
- Confirm the user has the knowledge needed to perform activities or use products
- Establish the role users play in a process

These aspects affect if individuals can understand what they need to do as well as use products or content to achieve a healthcare objective in a context of care. Per L-PXD, effective comprehension involves addressing the following factors (St.Amant, 2017a):

Recognition of Items: Individuals must identify/recognize an item in order to use it. Because varying experiences can affect recognition, product developers, content creators, and UX professionals must therefore identify:

- The items individuals use to access content in a context of care
- The materials individuals expect to use for healthcare activities in that setting
- The designs individuals expect and rely on to identify items in that location

The resulting information can help in designing products and creating content patients can recognize and use per their experiences-related expectations.

Literacy of User: In healthcare context, literacy often includes:

- *Ability to Use Modes of Communication:* This element involves if individuals have the literacy (procedural knowledge) needed to access information in certain formats or modes. These dynamics can include literacy levels associated with reading texts, technology literacy for accessing digital information, or visual literacy for interpreting graphical elements. The objective is to determine such elements of audience literacy in order to deliver products or information via modes patients can use.

- *Ability to Understand Information Presented:* This factor encompasses style and vocabulary used, when to explain ideas vs. assume knowledge of a concept, and selecting examples to illustrate processes. Such factors can affect if patients can use products or content because they understand what to do, what to use, and how. Addressing these factors requires collaboration with patients to identify their knowledge of a topic in order to create comprehensible and usable materials for them.

Background of Actors: Just because individuals understand words and concepts or know what a product is does not mean they can use products or content to perform activities. For example, the fact I understand texts describing a surgical process does not mean I can perform that surgery any more than my ability to recognize a scalpel means I can use it to perform surgery. Rather, certain experience and training are often essential to undertaking various healthcare tasks and using related items. These factors affect if individuals can use products or content to perform certain processes. Product designers, content creators, and UX professionals must therefore determine:

- what training or background individuals in a context of care have,
- what healthcare activities individuals can perform based on this background,
- and create products or content that meets related patient backgrounds, abilities, and expectations.

Roles of Participants: In healthcare contexts, comprehension also means establishing who will perform different tasks in terms of:

- *Activity:* The individual responsible for performing certain activities in a process. Is one, for example, the sole actor who performs all caregiving activities or one actor who collaborates with others to provide care? Knowledges or such roles and related expectations is essential to providing information and creating products that allow individuals to perform activities in a context of care.
- *Items:* Individuals must often use certain items to perform a care-related process associated with their role in a context of care. The key is to determine what these individuals expect to use and what they know about using these items to provide care. Equally important is determining if individuals should bring such materials (e.g., products or content) to a setting or if those items will be there for individuals to use. Knowing such factors is central to creating products and content individuals can use based upon whey they expect to do in contexts of care.

Identifying these dynamics can help in developing products and content that meet patient usability expectations in healthcare settings.

Acceptability

The final usability element is if individuals *want* to use items. This acceptability factor involves if patients consider products or content legitimate and credible in relation to the healthcare activities performed in a context of care (St.Amant, 2015, 2017a). Essentially, acceptable materials will be considered and used; unacceptable ones will not.

According to L-PXD (St.Amant, 2017a), acceptability involves three factors:

1. *Processes to Perform:* Audiences can have different expectations of what constitutes a credible healthcare process or associated credible healthcare item (e.g., product or document) worth using. These factors can affect if individuals accept and use certain processes—and related products or content—to achieve healthcare goals. Some audiences, for example, consider acupuncture a credible treatment for high blood pressure; it is viewed with skepticism by others. This difference can affect if audiences use—or expect to use—acupuncture-related products and content in a health-related context.
2. *Presentations of Processes:* Healthcare processes often encompass sensitive topics or controversial subjects. The design of content on or products associated with such topics can affect if individuals consider such items acceptable for use or offensive and to be avoided. If certain product features or content factors (e.g., visuals) violate a patient's sense of appropriateness, that person might refuse to use associated products or documentation. Product developers, content creators, and UX professionals therefore need to understand such factors and develop products or content accordingly.
3. *Participants in Processes:* Who is a credible healthcare provider can vary from person to person. Such differences can affect if patients heed the advice of a care provider or even allow individuals to perform care-related activities. Identifying such expectations helps determine the best methods for conveying healthcare information or designing healthcare products. Doing so involves determining:
    - Who patients consider to be legitimate healthcare providers
    - What credentials or criteria patients associate with this credibility
    - How individuals should display this credibility per patient expectations

If patients must consult informational sources during a process, one must also determine what those patients associate with credible sources and provide content that meet these expectations.

The complexities of acceptability make it challenging, but addressing such factors is often essential to patients using healthcare products or content. The better individuals understand such aspects, the more effectively they can create content and products patients will use in a context of care.

Researching User Expectations

L-PXD makes patients central collaborators in the development and design of healthcare products and content by working with patients to identify their access, comprehension, and acceptability expectations. The first step involves determining which patient groups to collaborate with based on their experiences accessing and receiving healthcare (see St.Amant, 2017a, 2017b, 2019). This first step is particularly important per addressing issues of inclusion and equity in healthcare as the exclusion of different groups and communities has historically led to healthcare disparities across communities, societies, and regions (Braveman, 2014). Next, individuals need to employ certain methods to identify usability expectations via interactions with patient collaborators. L-PXD facilitates such activities by engaging with patients to identify their context of care expectations.

Engaging in such interactions requires individuals recognize the patient information they collect often covers a variety of personal and sensitive topics. Such factors could affect if patients agree to participate in such collaborations, the answers they provide to questions (see "Interviews and Focus Groups" sections), and their willingness to participate in follow-up activities (see "Task Assessment and User Testing" section). Individuals doing such research must therefore begin such collaborations by:

- Obtaining related permission (e.g., IRB approval) from their organization or institution prior to conducting this research
- Confirming the collection of patient data follows legal statues (e.g., HIPPA) and ethical codes (AMA Code of Ethics)
- Providing prospective patient collaborators with clear explanations of what the research process will entail, what data will be collected from them, how that data will be organized (e.g., identified or de-identified), stored, and used as well as for how long that data will be kept and how it will be disposed of
- Offering prospective patient collaborators the opportunity to opt out of (i.e., exclude themselves from) the research process at any point in time as well as the opportunity to request their data be removed/not considered at a later point in time per patient prerogative
- Explaining what control patient collaborators have over their data in terms of rights to access, review, amend, or remove such information during and after the research process is complete
- Following best research practices of the researcher's discipline or field in interacting with patient collaborators during and after the overall research process

Such factors provide patient collaborators with the means for understanding related processes and the agency essential to maintaining control over their personal information throughout such activities. These factors also help the individuals conducting such research collaborate with patients in ways that respect the patients' integrity as a collaborator as well as conform to best practices for engaging in human subjects research.

Interviews and Focus Groups

Interviews are one-on-one interactions where product developers, content creators, and UX researchers can ask patient collaborators questions on their context-of-care expectations. Resulting responses can provide insights on individual perspectives associated with different healthcare processes (InterQ, 2020; Schwab, 2020). Focus groups involve asking the same questions to a gathering of three to eight patient collaborators to obtain that group's perspective on such factors (InterQ, n.d.?; Schwab, 2020). Combining these methods allows one to compare individual and group perspectives in order to identify the healthcare expectations for a particular patient group.

Access

Access factors are the first context of care aspect to identify, and individuals can use the following interviews/focus group questions to research such expectations:

- Do you do [healthcare process] yourself or have someone else do it for you?
- When do you perform this process?
- Where do you perform [healthcare process]?
- What do you (or others) use to access information when you perform this process?
- What do you (or others) use (or expect others to use) to perform this process?
- How do you (or others) contact individuals with questions or updates or obtain needed items during this process?

The responses can provide patient perspectives on access expectations in healthcare contexts.

Comprehension

Next, individuals need to expand their questioning to address the comprehension expectations of patient collaborators. This involves augmenting interview and focus group questions as follows:

- Do you do [healthcare process] yourself or have someone else do it for you?
- When do you perform this process?
- Where do you perform [healthcare process]?
    - *Can you describe this location to me? What is in that location?*

- What do you (or others) use to access information when you perform this process?
    - *Can you describe that item to me? What does it look like, feel like, and sound like?*
- What do you (or others) use (or expect others to use) to perform this process?
    - *Can you describe these items to me? What do they look like, feel like, and sound like?*
- How do you (or others) contact individuals with questions or updates or obtain needed items during this process?
    - *What do you use? Can you describe it/them to me?*

The questions in italic prompt patient collaborators to note the features they use to recognize and use products and content for the related healthcare process. Individuals should compare resulting responses to identify the items (e.g., tools, technologies, and documentation) patients associate with such situations and the features patients use to recognize those items.

Acceptability

Interviews and focus groups can also identify patient expectations of acceptable healthcare products, content, or processes. Doing so involves asking patient collaborators the following questions:

- Can you describe the process to me from the beginning to the end? What are the different steps in this process?
- Who performs each step?
- (If not the patient) How do you identify this person? Can you describe that person to me?
- What do you use to do this step?/What does that other person use to do this step?
- Can you describe that item (those items) to me?
- Can you describe how you use that item (those items) to perform this process?/Can you describe how that other person uses that item (those items) to perform this process?
- Do you consult anything—a manual, a website, some other source—for information during or after this process?
- (If yes) Can you describe that item/those items to me?
- Where did you get that item/those items?
- If you have to obtain answers or information or obtain needed items during or after this process, what would you do? Who would you contact or what would you use? Can you describe this process to me? Can you describe the item(s) you use to me?

- How do you know that source (or what source) is trustworthy for such information?
- Can you describe that trustworthy source to me? What makes it trustworthy?

These questions help identify factors patient collaborators associate with credible processes, individuals, items, and content involved in healthcare activities. They also help identify what patients consider credible sources of information for these activities. Individuals can then use this information to identify the mental models patient collaborators rely on when assessing usability in such contexts.

Observational Methods

What patients say they do and what they actually do can differ (Eyal, 2014). Individuals researching patient expectations should therefore collect certain information beyond responses to questions noted here. L-PXD advocates using observations to compare if words and actions align per patient behaviors in contexts of care. Doing so involves observing patient collaborators as they perform a healthcare process in a context of care. (Note: Researching such behaviors involves following the guidelines for patient awareness and data collection noted at the start of this overall section.) Such practices could take one of two forms: non-participant observation and think-aloud protocols.

Non-participant observation involves visiting the setting patients identified as where a caregiving activity occurs and silently (without interacting with patients) observing how individuals perform health-related processes there (Crossman, 2019). During these observations, one would note:

- What products or content patients use when performing healthcare activities there
- What patients use to perform such processes and
  - If these items are already in that setting at that time

  or
  - If someone brings these items to that setting—if so, who and how
- What patients use to access outside information or items as well as to share information with individuals outside of that immediate context

Observers/researchers would review information from multiple observations to identify how patient collaborators perform healthcare processes in that setting. (The number and length of visits would depend on available time and resources.)

While this approach provides information on what patients do in a context of care, the lack of interaction means observers/researchers:

- Are dependent on their observational skills to note factors involved in such processes.

- Cannot determine (other than guess) why individuals engage in behaviors or use items.

Additionally, patient awareness of being observed—as well as the venues where observations occur—might affect how they perform activities (Crossman, 2019).

Think-aloud protocols involve interacting with patient collaborators during a process (Nielsen, 2012). Such interactions allow observers to ask questions about why patents engage in certain behaviors and use certain items during a process in order to determine both what patients do and why when performing an activity (Nielsen, 2012). The resulting information could be used in in combination with data from non-participant observations to understand patient behaviors.

During think-aloud protocols, observers/researchers could ask patient collaborators to explain what they are doing and why as they perform a particular activity in a context of care. Such an approach can help:

- Clarify actions (e.g., "What are you doing now? Can you describe this process or show it to me?")
- Identify items involved in actions ("What are you using to perform that task? Can you show me or describe it to me?")
- Determine underlying reasons for such behaviors ("Why did you decide to do that? Why did you use that item for that task?")

Ideally, researchers would collect data from as many patient collaborators as possible to identify common actions and uses of items in a context of care. When combined with interview and focus group data, the resulting information could help identify patient usability expectations for contexts of care.

Developing and Testing Designs

Researchers would review the data collected via the methods noted previously to identify patterns in how patients access, understand, and evaluate the acceptability of products and content used in a context of care. Researchers could use the resulting information to create the following resources to guide product development and content creation:

- A *checklist of features* to include or items to address when designing products or content patients can access, comprehend, consider acceptable, and use in a context of care.
- A *sample design (e.g., a sketch) of a context of care* based on and including features and items from the design checklist.
- *Draft materials*—documentation, online informational products, or devices—for individuals to use in a context of care (St.Amant, 2017a, 2017b).

These initial resources are not final products. Rather, they require testing with patient collaborators to evaluate how effectively the meet patient usability expectations as well as address:

- Inaccurate information collected during interviews and focus groups.
- Limited ability of observers to note certain factors during observations.
- Lack of patient comments on a particular item during think-aloud sessions.

Testing these draft resources allows one to collect additional patient input and revise these items to better parallel patients' usability expectations. As such processes involves collecting information from patients, researchers need to follow the guidelines for data-collection noted at the start of the "Researching User Expectations" section when collaborating with patients to do such testing.

Interviews and Focus Groups

When evaluating draft resources, researchers can use interviews and focus groups to collect patient perspectives and reactions. Such interactions could involve asking patient collaborators to review draft resources and respond to the following questions:

For draft representations of context of care or draft items created for such contexts:

- Where is this? (for locations/contexts)

Or

- What is this? (for items/objects)

If individuals correctly identify a location:

- How do you know?
- Would you modify the design of this location? How? Why would you modify it that way?
- Can you identify the items in this location?

As individuals identify items:

- What is it (item) used for?
- Who uses it?
- How do you (or they) use it? Describe this process for me.
- Would you modify the design of this item? How? Why would you modify it that way?

If individuals cannot identify the location:

- How would you modify this representation to make it resemble a [context of care]?
- What would you add?

- What existing features would you modify? How?
- Would you remove anything? (If yes) Why would you remove it?

If individuals cannot identify draft items or items in a draft context of care representation:

- How would you modify [item] to make it better resemble a [kind of item]?
- What would you add?
- What existing features would you modify? How?
- Would you remove anything? (If yes) Why would you remove it?

Researchers can use the resulting answers to modify the related draft resources to better reflect patient expectations for healthcare activities and related contexts of care (St.Amant, 2017a, 2017b).

Task Assessment and User Testing

Recognition and acceptability represent some aspects affecting usability. The additional aspect to assess is comprehension—do individuals understand how to use an item to perform a healthcare activity in a location. Evaluating comprehension involves patient collaborators using draft items to perform care-related activities in a context of care.

For such evaluations, researchers would bring patient collaborators to or meet them in the location where they engage in a healthcare activity. Researchers would then present patient collaborators with a draft item—a draft document, beta version of an app, or a prototype of a product—and ask those collaborators to use the item to perform a specific healthcare activity in that setting (St.Amant, 2017, 2018). Patient collaborators would be instructed to talk out loud during such processes and to note:

- What they are doing and why.
- What aspects are particularly effective or ineffective.
- What makes such aspects effective or ineffective.
- How to modify ineffective items to be more effective.

Researchers would record these activities and comments as well as note:

- How long it takes patient collaborators to use a draft item to perform a process.
- How many individuals successfully complete the process.
- If activities were done correctly.

Researchers would also note when (and, ideally, why) a process seemed to break down or an unexpected pattern of use emerged.

After patient collaborators complete a process, researchers would ask individuals:

- Do you think you completed the activity effectively? (If no, why not?)
- Do you think you completed the activity in a reasonable amount of time? (If no, why not?)

If patient collaborators did not complete the assigned task, researchers would ask them:

- At what point did you notice the process was not going well?
- What happened then that affected the process?
- What would you suggest as a solution to avoid this problem in the future?

All participants would then be asked:

- What aspects of the process did you think went well? Why?
- What aspects of the product [item they used] did you think were effective? Why?
- What aspects of the process did not go well? Why? Do you have any suggestions for how to improve such items?
- What aspects of the product [item they used] did not work well? Why? What suggestions do you have for how to fix such factors?
- Do you have any additional suggestions or comments on the process you performed or on the items you used?

The resulting answers could help identify additional areas where revisions are needed to better meet the usability and context-of-care expectations of patient collaborators.

Applying Results and Assessing Revisions

Researchers could use testing results to modify draft materials and related design resources/checklists. Ideally, they would test these revised items with new patient collaborators representing the same audience. Such testing would involve similar methods, questions, and assigned tasks to evaluate the usability of revised designs (St.Amant, 2017a, 2017b).

The results of this second round of assessment could help determine if additional revisions are needed to meet the usability expectations of patient collaborators. If additional revisions are needed, researchers would again revise sample items and corresponding resources and then re-test these revised items with patient collaborators representing the same audience. This iterative process of test, review data, revise, and test revision would continue until testing indicated a usable design was achieved or the time and resources for these processes are exhausted (St.Amant, 2017a, 2017b). Ideally, this iterative process would allow researchers to create the product development/content creation resources and associated items that meet the usability expectations of the intended patient audience.

Implications for Readers

While this chapter examines collaborations related to healthcare contexts, readers can apply the ideas covered in the chapter to developing usable materials for almost any situation. The core ideas of access, comprehensibility, and acceptability are central ones to address when creating usable designs in general. Moreover, the cognitive factors described and the methods used to identify them are not restrictive to healthcare contexts. Rather, they are relatively easy-to-implement approaches for identifying common cognitive processes.

These factors mean readers can use the methodology described in the chapter to collaborate with audiences associated with almost any product. This is because the cognitive processes the chapter described affect usability expectations in general. Moreover, by using the research approach described here, individuals can effectively collaborate with different partners to identify the usability expectations for different groups. The researchers and their collaborators can then use the resulting information to develop usable designs and products based on the testing and assessment processes the chapter describes. So, while the chapter focuses on health-related situations, readers can apply these same approaches and ideas across different collaborative situations to help develop usable designs.

Thoughts

The usability of an item reflects how well it meets the expectations of the individuals who use it. By understanding the cognitive models affecting such processes, product developers, content creators, and UX professionals can conduct the research needed to identify such expectations. Doing so requires collaborating with the intended patient audience throughout the content/product development process. Localized Patient Experience Design (L-PXD) facilitates such collaborations to created products and content patients consider usable in healthcare settings.

By guiding collaborative interactions to focus on understanding patient expectations, L-PXD fosters effective interactions with patient collaborators throughout product design and content development processes. Through collaborative methods for collecting information and testing draft designs, L-PXD enhances understanding of the usability expectations of specific patient audiences. Through guided interactions with patients, L-PXD can help product developers and content creators address the cognitive models that guide how patients use materials in contexts of care.

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